



The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces
through safety and health research



Distribution Line Technician Dies after Contacting Energized Conductor

FACE 89-27

Introduction:

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), performs Fatal Accident Circumstances and Epidemiology (FACE) investigations when a participating state reports an occupational fatality and requests technical assistance. The goal of these evaluations is to prevent fatal work injuries in the future by studying the working environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact.

On January 20, 1989, a 37-year-old male distribution line technician received third-degree burns to his leg and back when he contacted an energized conductor while repositioning a bucket to perform maintenance on a power line. He died 37 days later as a result of a secondary infection.

Contacts/Activities:

State officials notified DSR of this fatality and requested technical assistance. On March 22, 1989, a DSR research team consisting of a research safety specialist and a safety engineer, met with company officials, and visited and photographed the incident site.

Overview of Employer's Safety Program:

The employer is a power line construction and maintenance corporation with 325 employees, 90 of whom are employed as distribution line technicians. The corporation has been in operation for 70 years, and serves as the prime contractor for a major utility company. The corporation has a comprehensive safety program with safety meetings held each Monday morning. In addition, "tailgate" meetings are held daily before work to review the planned tasks and to address any unusual situations likely to be encountered. The company employs a safety consulting firm and obtains additional safety consulting services and inspections from their insurance carrier. Periodic unannounced safety inspections of every crew are conducted at different times by corporation supervisory personnel, utility company supervisors, safety consulting personnel, and insurance company personnel. An observed violation of company safety policies results in immediate cessation of work and a 3-day suspension for the involved employee. Subsequent safety violations by the employee may result in dismissal.

Traditionally, the corporation has trained all employees by starting them as groundmen and entering them in a 6-year apprenticeship program. However, due to a recent increase in work load the corporation hired 6 "journeyman" line technicians who received training elsewhere. These line technicians were assigned to work with other line technicians trained by the corporation. The victim was one of these new employees, and had been with the corporation for 4 months at the time of the incident. However, he had 18 years' previous experience in power line construction.

Synopsis of Events:

On the day of the incident the victim was working as a member of a two-person crew replacing power line fuses to match an anticipated increased load on a line.

The power lines they were working on comprised a three-phase circuit with a phase-to-phase potential of 12,470 volts. In order to prevent power outages and surges affecting customers, this work had to be performed while the lines were energized. The first step in the normal procedure involved positioning and grounding the bucket truck. Then one of the crew would use the bucket to access the power lines, where a second ground would be installed from the bucket unit to the neutral wire. Next, a jumper wire would be installed around the fuse holder, the fuse would be replaced, and the jumper would be removed. This process would then be repeated on the other two phases of the circuit.

The crew had been working since 7:30 a.m. on power line poles beside side streets with a minimum amount of traffic. At 2:30 p.m. the crew was "spot checked" by a utility company supervisor, who found that they were following all policies and procedures, and were using all appropriate personal protective equipment. Shortly after 3:00 p.m. the crew moved to a pole located along a major two-lane highway. Because of the heavy volume of traffic on this road, the crew positioned the bucket truck they were using in a parking lot adjacent to the power line pole.

The victim, following the procedure outlined above, had changed the fuse on the first phase of the circuit; i.e., the power line closest to the bucket truck. He then repositioned the bucket to obtain access to the center of the three phases. Two sections of line hose for covering the energized conductor were in the bucket with the victim, but he did not use them. The victim attached one end of the jumper wire to the center phase, and placed the other end of the now energized jumper inside the fiberglass bucket with him. (This was a violation of company policy.) The uninsulated end of this jumper came into contact with the victim's right thigh. The victim repositioned the bucket to obtain access to a second point on the center phase conductor, where he planned to attach the free end of the jumper prior to changing the fuse. As he moved the bucket his upper back came into contact with the conductor he had previously worked on. A phase-to-phase path was established between the victim's right thigh and his back which resulted in extensive third-degree burns to his right leg and back.

The victim's co-worker, on the ground below, heard a noise and looked up, where he observed the victim's body smoking and saw the victim collapse within the bucket. The co-worker jumped onto the truck and began lowering the bucket while he summoned help via the onboard two-way radio. (A standard company distress signal serves to automatically call both a second crew and Emergency Medical Services (EMS) to the scene of an incident.) This distress signal was received by the EMS squad at 3:30 p.m. A unit was immediately dispatched, arriving at the scene of the incident at 3:33 p.m. A second crew also arrived on the scene shortly after the bucket had been lowered to the ground. The victim, who remained conscious, was removed from the bucket via a backboard by members of the EMS squad. He was transported to a local hospital, where he was treated and transferred by helicopter to a trauma center. He arrived at the trauma center less than 3 hours after the incident.

The victim lived for 37 days before dying as a result of an infection secondary to the third-degree burns he had received.

Cause of Death:

The medical examiner's report was pending at the time of this report. The presumed cause of death is infection subsequent to third degree burns.

Recommendations/Discussion

Recommendation #1: Guarding or shielding should be used whenever the potential for contact with energized conductors exists.

Discussion: While the victim in this case was wearing all appropriate personal protective equipment, including rubber gloves, sleeves, hard hat, eye protection, safety belt and lifeline, he still contacted two live energy sources (the end of the jumper and the adjacent conductor). A fiberglass clip, attached to the outside of the bucket for holding the end of the jumper, was not used. In addition, two sections of line hose for covering the energized conductor were in the bucket, but also were not used. Company policy required workers to use both the clip and the line hoses. Both were being used when the crew was observed 1 hour prior to the incident. Had either of these protective devices been used at the time the incident occurred, this death might have been prevented.

Recommendation #2: Bucket trucks should always be positioned to provide the best access to the power lines being serviced.

Discussion: While the traffic on the two-lane highway was heavy and could not have been controlled by the two-person crew on the scene, additional help to direct traffic could have been requested. Corporation policy called for the use of an additional crew whenever a traffic problem was encountered. Nevertheless, this crew chose to access the conductors by positioning the truck in the adjacent parking lot, resulting in increased difficulty in reaching the conductors. The additional maneuvering of the bucket truck required to reach the conductors was a contributing factor in this fatality.

Recommendation #3: Power lines should be de-energized prior to working in their vicinity.

Discussion: Prior to the beginning of any task involving work on power transmission lines, de-energizing these lines should be considered. Although de-energizing the lines might have been impractical in this case due to the customer power outages which would have resulted, in some cases it may prove to be a feasible action. When lines are de-energized the probability of being exposed to an electrical hazard is decreased and worker safety is increased.

Recommendation #4: When clearance between a worker and energized lines is likely to be minimal, a ground-based observer should watch the operation from below and advise the line technician in the bucket of potential problems.

Discussion: While a co-worker (groundman) was present on the ground in this case, he was not observing the line technician operating the bucket at the time of the incident. Had the groundman been watching, he may have observed the potential for contact with the energized line, and warned the victim, thereby preventing this fatality.

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